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Proposed amendment to the Montreal Protocol submitted by the European Union and its member States

Note by the Secretariat

Pursuant to article 9, paragraph 2, of the Vienna Convention for the Protection of the Ozone Layer, the Secretariat is circulating a proposal submitted by the European Union and its member States to amend the Montreal Protocol in respect of hydrofluorocarbon phase-down (see annex II) together with an explanatory memorandum on the amendment proposal (see annex I). The annexes are being circulated as received and have not been formally edited by the Secretariat.

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Annex I

Towards a global phase-down of HFCs under the Montreal Protocol
Explanatory memorandum to the amendment proposal submitted
by the European Union and its Member States

The European Union (EU) and its Member States submit a proposal to amend the Montreal Protocol. The amendment addresses the significant increase of HFC production and consumption, which has led to greater emissions. This amendment is necessary to safeguard and to maximise the climate benefits of the efforts made under this Protocol.

1. Leading considerations

Non-Article 5 Parties, today major consumers of HFCs, are to take the lead in this effort by committing to an ambitious phase-down schedule for the production and consumption of HFCs, beginning in 2019.

To address the different situations in Article 5 and non-Article 5 Parties, it is important that the respective commitments reflect that the phase-out of HCFCs has just started in Article 5 Parties. It is necessary that their socio-economic situation be taken into account, in particular the expected growth of the most relevant sectors using HCFCs and HFCs such as refrigeration and air-conditioning. It is appropriate therefore to apply a different and more flexible commitment design rather than applying the same commitments with a deferred schedule, as it is the case for the phase-out of controlled substances.

To benefit fully from synergies with the ongoing HCFC phase-out, which remains unchanged, measures on HFCs have to start as soon as possible, thus avoiding disruptions and costs caused by interim solutions that would require a further conversion in the future to remedy their adverse impacts on climate.

Additional flexibility is provided by the fact that the proposed measures are calculated in terms of CO_2 equivalents. This approach provides flexibility to increase the quantities of low GWP alternatives used as long as the climate impact does not grow.

The proposed measures for HFCs[1] are not aiming at a complete phase-out – as is the case for the ozone depleting substances controlled under the Montreal Protocol – but at reducing their production and consumption. These measures should complement efforts to reduce climate impacts under the UNFCCC.

This proposed amendment limits the introduction of environmentally harmful HFCs as alternatives to HCFCs and responds to the obligation under the Vienna Convention to protect the environment from adverse effects as a result of measures taken to save the ozone layer.

2. Commitment design

A new Article 2J sets out a reduction schedule for HFC production and consumption, starting in 2019 with a first reduction step to 85% and subsequent steps towards a reduction to 15% in 2034. The baseline includes a percentage of HCFCs, taking into consideration that during the reference period (2009-2012) in line with Article 2F, HCFCs were still produced and consumed.

Non-Article 5 Parties

Production and consumption

- *Baseline:* Average HFC production/consumption in the years 2009 to 2012 plus 45% of average HCFC production/consumption allowed under the Protocol in the years 2009 to 2012, expressed in CO_2 equivalents
- *Reduction schedule* for HFC production/consumption:

  2019: 85%
  2023: 60%
  2028: 30%
  2034: 15%

[1] Substances as listed in the proposed new Annex F.

Article 5 Parties are required to freeze the production of HFCs - expressed in CO_2 equivalents - in 2019, and reach a long-term reduction target by 2040. The baseline includes a share of HCFC production – expressed in CO_2 equivalents - acknowledging that during and after the chosen reference period (2009-2012) a conversion from HCFC to HFCs production may have taken place. Intermediate reduction steps for production should be agreed by 2020.

Article 5 parties are required to freeze the combined climate impacts of HCFC and HFC consumption - expressed in CO_2 equivalents - beginning in 2019, while maintaining the existing HCFC phase-out schedule. A long-term phase-down schedule for this combined HFC/HCFC consumption should be agreed by 2020, including the date for the last phase-down step. This commitment builds on previous decisions under the Montreal Protocol addressing the climate impacts of the replacement of ODS.

Article 5 Parties

Production

- *Baseline:* Average HFC production in the years 2009 to 2012 plus 70% of average HCFC production in the years 2009 to 2012, expressed in CO_2 equivalents
- *Freeze* of HFC production and *reduction target*:
  2019: 100%
  2040: 15%
- *Reduction schedule*: Intermediate reduction steps to be agreed by 2020

Consumption

- *Baseline:* Average HFC and HCFC consumption in the years 2015/2016, expressed in CO_2 equivalents
- *Freeze* of combined HCFC and HFC consumption, expressed in CO_2 equivalents:
  2019: 100%
- *Reduction schedule*: Reduction schedule and reduction steps to be agreed by 2020

3. Other provisions

Although HFCs are not considered as controlled substances subject to a complete phase-out, it is necessary to extend the scope of a number of provisions to substances listed in Annex F in order to implement the specific reduction measures. This includes the provisions on trade with non-parties, licensing, assessment and review, data reporting, non-compliance, research, development, public awareness and exchange of information.

The proposal includes provisions to limit the climate impacts of HFCs resulting inadvertently or coincidentally from the production of HCFCs and HFCs.

4. Finance

Measures related to the HFC production and consumption in Article 5 Parties will be funded via the Multilateral Fund.

The Parties are mandated to agree by means of decision the policies and obligations that will apply for the operation of the Multilateral Fund with respect to the new HFC requirements.

5. Estimated environmental benefits

Global cumulative benefits of the HFC consumption freeze and a production reduction in Article 5 Parties as well as the phase-down of both production and consumption in non-Article 5 Parties amount to a reduction of 79 Gt CO_2eq by 2050 and 127 Gt CO_2eq over 40 years. Furthermore, additional emission reductions can be achieved by addressing HFC-23 by-production.

Reductions in Article 5 Parties amount to 56 Gt CO_2eq by 2050, to a large degree due to avoided future consumption and the reduction of production. Additional reductions are possible by agreeing a phase-down schedule by 2020.

For non-Article 5 Parties, the global cumulative reduction, from current HFC consumption, and the production phase-down amounts to 23 Gt CO_2eq by2050.

Cumulative estimated environmental benefits of the EU amendment proposal in Article 5, non-Article 5 Parties and globally

Gt CO_2eq	**2050**	**over 40 years**
Non-Article 5 Parties (phase-down of production + consumption)	23	33
Article 5 Parties (consumption freeze + production reduction)	56	94
Global total	**79**	**127**

Annex II

Text of the amendment proposal submitted by the European Union and its Member States

Article I: Amendment

A. Preambular paragraphs

In the 2nd preambular paragraph of the Protocol, after the words:

"ozone layer"

there shall be added:

", including changes in climate which have significant deleterious effects"

In the 4th preambular paragraph of the Protocol, after the word:

"substances"

there shall be added:

", and substances commonly used to replace ozone depleting substances"

B. Article 1: Definitions

The following paragraph shall be inserted after paragraph 4 of Article 1 of the Protocol:

"4bis. "Substance listed in Annex F" means a substance specified in Annex F to this Protocol, whether existing alone or in a mixture. It includes the isomers of any such substance, except as specified in the Annex, but excludes any substance or mixture which is in a manufactured product other than a container used for the transportation or storage of that substance. These substances are not controlled substances as defined in paragraph 4 of this Article."

In paragraph 5 of Article 1 of the Protocol, after the word:

"substances"

there shall be added:

"or of substances listed in Annex F"

In paragraph 6 of Article 1 of the Protocol, after the words:

"controlled substances"

there shall be added:

"or of substances listed in Annex F"

C. Article 2: Control Measures

In paragraph 5 of Article 2 of the Protocol, for the words:

"Article 2A to 2F and Article 2H"

there shall be substituted:

"Articles 2A to 2F, Article 2H and Article 2J"

and after the words:

"controlled substances"

there shall be added:

"or substances listed in Annex F"

The following words shall be added at the end of subparagraph (a) of paragraph 8 of Article 2 of the Protocol:

"Any such agreement may be extended to include obligations respecting consumption or production under Article 2J provided that the total combined calculated level of consumption or production of the Parties concerned does not exceed the levels required by Article 2J."

In subparagraph (b) of paragraph 8 of Article 2 of the Protocol, after the word:

"consumption"

there shall be added:

"or production for the substances"

In subparagraph (a)(i) of paragraph 9 of Article 2 of the Protocol, after the second use of the words:

"should be;"

there shall be deleted:

"and"

Subparagraph (a)(ii) of paragraph 9 of Article 2 of the Protocol shall be renumbered as subparagraph (a)(iii), and after the words:

"controlled substances"

there shall be added:

"or of substances listed in Annex F"

The following shall be added after subparagraph (a)(i) of paragraph 9 of Article 2 of the Protocol:

"(ii) Adjustments to the global warming potentials specified in Annex C or in Annex F should be made and, if so, what the adjustments should be; and"

In subparagraph (b) of paragraph 10 of Article 2 of the Protocol, for the words:

"control measures"

there shall be substituted:

"measures"

In paragraph 11 of Article 2 of the Protocol, for the words:

"2A to 2I"

there shall be substituted each time they occur:

"2A to 2J"

D. Article 2J: Hydrofluorocarbons

The following Article shall be inserted after Article 2I of the Protocol:

"Article 2J: Hydrofluorocarbons

1. Each Party shall ensure that for the twelve-month period commencing on 1 January 2019 and in each twelve-month period thereafter, its calculated level of consumption of the substances listed in Annex F, expressed in CO_2 equivalents, does not exceed the percentage, set out for the respective year, of the annual average of its calculated levels of consumption of substances listed in Annex F during the period 2009 to 2012 plus forty-five per cent of the annual average of the limits for its

calculated level of consumption of controlled substances in Annex C, Group I as determined in Article 2F for the same reference period, expressed in CO_2 equivalents:

(a) 2019 to 2022: 85%

(b) 2023 to 2027: 60 %

(c) 2028 to 2033: 30 %

(d) 2034 and following years: 15 %.

2. Each Party shall ensure that for the twelve-month period commencing on 1 January 2019 and in each twelve-month period thereafter, its calculated level of production of the substances listed in Annex F, expressed in CO_2 equivalents, does not exceed the percentage set out for the respective year of the annual average of its calculated levels of production of substances listed in Annex F during the period 2009 to 2012 plus forty-five per cent of the annual average of the limits for its calculated level of production of controlled substances in Annex C, Group I as determined in Article 2F for the same reference period, expressed in CO_2 equivalents:

(a) 2019 to 2022: 85%

(b) 2023 to 2027: 60 %

(c) 2028 to 2033: 30 %

(d) 2034 and following years: 15 %.

3. Each Party producing Annex C, Group I substances, or substances listed in Annex F, shall ensure that for the 12 month period commencing on 1 January 2019, and in each 12-month period thereafter, its calculated level of substances listed in Annex F, Group II, resulting directly or indirectly, inadvertently or coincidently from each production line that produces Annex C, Group I substances or substances listed in Annex F does not exceed 0.1 per cent of the quantity of Annex C, Group I substances or substances listed in Annex F produced in that production line in the same 12 month period.

4. Each Party shall ensure that any destruction of substances listed in Annex F, Group II resulting directly or indirectly, inadvertently or coincidently from each production line that produces Annex C, Group I substances, or substances listed in Annex F, shall occur only by technologies approved by the Parties."

E. Article 3: Calculation of control levels

The paragraph in Article 3 of the Protocol becomes paragraph 1 of Article 3 of the Protocol and the following paragraphs shall be added thereafter:

"2. For the purposes of Articles 2, 2J and paragraph 8 qua of Article 5, each Party shall, for each group of substances listed in Annex F determine its calculated levels, expressed in CO_2 equivalents, of:

(a) Production by:

(i) multiplying its annual production of each substance listed in Annex C, Group I, or in Annex F by the global warming potential specified in respect of it in these Annexes;

(ii) adding together the resulting figures;

(b) Imports and exports, respectively, by following, *mutatis mutandis*, the procedure set out in subparagraph (a); and

(c) Consumption by adding together its calculated levels of production and imports and subtracting its calculated level of exports as determined in accordance with subparagraphs (a) and (b). From the date referred to in paragraph 2 sept of Article 4 onwards, any export of substances listed in Annex F to non-Parties shall not be subtracted in calculating the consumption level of the exporting Party;

(d) For the calculation of the calculated levels of substances in Annex C, Group I, referred to in Article 2J and in Article 5 paragraph 8 qua, the share of the individual substances reported for the reference period shall be taken into consideration for each Party.

3. Each Party shall determine its calculated levels, expressed in CO_2 equivalents, of substances listed in Annex F, Group II, resulting inadvertently or coincidentally from each production line that produces Annex C, Group I substances or substances listed in Annex F by multiplying the amounts generated by the global warming potential specified in Annex F, Group II, including amounts that are leaked or released from equipment, process vents, and destruction devices, but excluding amounts destroyed, recovered for use or stored."

F. Article 4: Control of trade with non-Parties

The following paragraph shall be inserted after paragraph 1 sex of Article 4 of the Protocol:
"1 sept. Within one year of the date of entry into force of this paragraph, each Party shall ban the import of the substances listed in Annex F from any State not party to this Protocol."

The following paragraph shall be inserted after paragraph 2 sex of Article 4 of the Protocol:

"2 sept. Within one year of the date of entry into force of this paragraph, each Party shall ban the export of the substances listed in Annex F to any State not party to this Protocol."

In paragraph 5 of Article 4 of the Protocol, for the words:

"A, B, C and E"

there shall be substituted:

"A, B, C, E or substances listed in Annex F"

In paragraph 6 and 7 of Article 4 of the Protocol, for the words:

"A, B, C and E"

there shall be substituted:

"A, B, C, E or of substances listed in Annex F"

In paragraph 7 of Article 4 of the Protocol, after the words:

"destruction of controlled substances"

there shall be added:

"or of substances listed in Annex F"

In paragraph 8 of Article 4 of the Protocol, for the words:

"Articles 2A to 2I"

there shall be substituted:

"Articles 2A to 2J"

In paragraph 9 of Article 4 of the Protocol, after the words:

"controlled substance"

there shall be added:

"or a substance listed in Annex F"

and for the words:

"control measures"

there shall be substituted:

"measures"

G. Article 4B: Licensing

The following paragraph shall be inserted after paragraph 2 of Article 4B of the Protocol:

"2 bis. Each Party shall, by 1 January 2019 or within three months of the date of entry into force of this paragraph for it, whichever is later, establish and implement a system for licensing the import and export of new, used, recycled and reclaimed substances listed in Annex F. Any Party operating under paragraph 1 of Article 5 that decides it is not in a position to establish and implement such a system by 1 January 2019 may delay taking those actions until 1 January 2021."

H. Article 5: Special situation of developing countries

In paragraph 4 of Article 5 of the Protocol, for the words:

"control measures"

there shall be substituted:

"obligations"

for the words:

"Articles 2A to 2I"

there shall be substituted:

"Articles 2A to 2J"

and after the words:

"controlled substances"

there shall be added:

"in Annex A to E or of substances listed in Annex F"

In paragraph 5 of Article 5 of the Protocol, after the words Article 2I, for the word:

"and"

there shall be substituted:

"with"

and after the words:

"paragraph 1 bis of this Article"

there shall be added:

"or with obligations set out in paragraph 8 qua"

In paragraph 6 of Article 5 of the Protocol, for the words:

"any or all of the obligations"

there shall be substituted:

"obligations"

for the words:

"Articles 2A to 2E and Article 2I, or any or all"

there shall be substituted:

"Articles 2A to 2E, Article 2I and Article 2J,"

and after the words:

"paragraph 1 bis of this Article"

there shall be added:

"or obligations set out in paragraph 8 qua"

The following paragraph shall be inserted after paragraph 8 ter of Article 5 of the Protocol:

"8 qua. By way of derogation from Article 2J and without prejudice to the obligations under paragraph 8 ter or Article 2F, each Party operating under paragraph 1 of this Article shall, subject to any adjustment in accordance with Article 2(9), ensure that:

(a) for the twelve-month period commencing on 1 January 2019, and in each 12-month period thereafter, its combined calculated levels of consumption of the substances in Annex F and of the controlled substances in Annex C, expressed in CO_2 equivalents, does not exceed, annually, the annual average of its calculated levels of consumption of these substances during the period 2015 to 2016. Further reduction steps and their timing shall be agreed by the Parties by 2020;

(b) for the twelve-month period commencing on 1 January 2019, and in each 12-month period thereafter, its calculated level of production of the substances in Annex F, expressed in CO_2 equivalents, does not exceed, annually, the annual average of its calculated level of production of substances listed in Annex F during the period 2009 to 2012 plus seventy per cent of the annual average of its calculated levels of production of controlled substances in Annex C, Group I during this reference period. Further reduction steps and their timing shall be agreed by the Parties by 2020;

(c) for the twelve-month period commencing on 1 January 2040, and in each twelve-month period thereafter, its calculated level of production of the substances in Annex F, expressed in CO_2 equivalents, does not exceed fifteen per cent of the annual average of its calculated level of production of substances listed in Annex F during the period 2009 to 2012 plus seventy per cent of the annual average of its calculated levels of production of controlled substances in Annex C, Group I during this reference period."

I. Article 6: Assessment and review of control measures

In Article 6 of the Protocol, for the words:

"control measures"

there shall be substituted each time they occur, including in the title:

"measures"

and for the words:

"Article 2 and Articles 2A to 2I"

there shall be substituted:

"Article 2 and Articles 2A to 2J"

J. Article 7: Reporting of data

The following paragraph shall replace paragraph 2 of Article 7 of the Protocol:

"2. Each Party shall provide to the Secretariat statistical data on its production, imports and exports of each of the

- controlled substances in Annex B and Groups I and II of Annex C for the year 1989;
- controlled substances in Annex E, for the year 1991,
- substances listed in Annex F for the years 2009 to 2012, and for the years 2015 and 2016 in the case of Parties operating under paragraph 1 of Article 5,

or the best possible estimates of such data where actual data are not available, not later than three months after the date when the provisions set out in the Protocol with regard to the substances in Annexes B, C, E and F respectively enter into force for that Party."

In paragraph 3 of Article 7 of the Protocol, after the first use of the words:

"Annexes A, B, C and E"

there shall be added:

", and of the substances listed in Annex F,"

and for the second use of the words:

"Annexes A, B, C and E"

there shall be substituted:

"Annexes A, B, C, E and F"

In paragraph 3 bis of Article 7 of the Protocol, after the words:

"Group I of Annex C"

there shall be added:

"and the substances listed in Annex F"

and after the word:

"recycled"

there shall be added:

"or reclaimed"

The following paragraph shall be inserted after paragraph 3 bis of Article 7 of the Protocol:

"3 ter. Each Party shall provide to the Secretariat statistical data on the substances listed in Annex F, Group II resulting directly or indirectly, inadvertently or coincidently from production lines that manufacture Annex C, Group I substances or substances listed in Annex F, in accordance with paragraph 3 of Article 3, making best use of any related data collected, as well as on the amount of substances listed in Annex F, Group II captured and destroyed by technologies approved by the Parties."

In paragraph 4 of Article 7 of the Protocol, for the words:

"paragraphs 1, 2, 3 and 3 bis"

there shall be substituted:

"paragraphs 1 to 3 ter"

and after the words:

"statistical data on"

there shall be added:

"production,"

K. Article 9: Research, development, public awareness and exchange of information

In paragraph 1 of Article 9 of the Protocol, after the words:

"controlled substances"

there shall be added each time they occur:

"or substances listed in Annex F"

In subparagraph (c) of paragraph 1 of Article 9 of the Protocol, after the words:

"relevant control"

there shall be added:

"and reduction"

In paragraph 2 of Article 9 of the Protocol, for the words:

"controlled substances and other substances that deplete the ozone layer"

there shall be substituted:

"controlled substances, other substances that deplete the ozone layer and of substances that are used to replace those substances, in particular those substances listed in Annex F"

L. Article 10: Financial mechanism

In paragraph 1 of Article 10 of the Protocol, for the words:

"Articles 2A to 2E and Article 2I, and any control measures in Articles 2F to 2H that are decided pursuant to paragraph 1 bis of Article 5 of the Protocol"

there shall be substituted:

"Articles 2A to 2E and Article 2I, any control measures in Articles 2F to 2H that are decided pursuant to paragraph 1 bis of Article 5 of the Protocol or with the measures laid down in Article 2J and in paragraph 8 qua of Article 5"

and after the words:

"control measures of the Protocol"

there shall be added:

"and the obligations laid down in Article 2J and in paragraph 8 qua of Article 5"

M. Article 17: Parties joining after entry into force

In Article 17 of the Protocol, for the words:

"Articles 2A to 2I"

there shall be substituted:

"Articles 2A to 2J"

N. Annexes

1. Annex C: Controlled substances

The following table shall replace the table for Group I in Annex C to the Protocol:

Group	Substance	Number of isomers	Ozone-Depleting Potential*)	Global Warming Potential (100 years)***
Group I				
$CHFCl_2$	(HCFC-21)**	1	0.04	151
CHF_2Cl	(HCFC-22)**	1	0.055	1810
CH_2FCl	(HCFC-31)	1	0.02	
C_2HFCl_4	(HCFC-121)	2	0.01-0.04	
$C_2HF_2Cl_3$	(HCFC-122)	3	0.02-0.08	
$C_2HF_3Cl_2$	(HCFC-123)	3	0.02-0.06	77

Group	Substance	Number of isomers	Ozone-Depleting Potential*	Global Warming Potential (100 years)***
$CHCl_2CF_3$	(HCFC-123)**	-	0.02	
C_2HF_4Cl	(HCFC-124)	2	0.02-0.04	609
$CHFClCF_3$	(HCFC-124)**	-	0.022	
$C_2H_2FCl_3$	(HCFC-131)	3	0.007-0.05	
$C_2H_2F_2Cl_2$	(HCFC-132)	4	0.008-0.05	
$C_2H_2F_3Cl$	(HCFC-133)	3	0.02-0.06	
$C_2H_3FCl_2$	(HCFC-141)	3	0.005-0.07	
CH_3CFCl_2	(HCFC-141b)**	-	0.11	725
$C_2H_3F_2Cl$	(HCFC-142)	3	0.008-0.07	
CH_3CF_2Cl	(HCFC-142b)**	-	0.065	2310
C_2H_4FCl	(HCFC-151)	2	0.003-0.005	
C_3HFCl_6	(HCFC-221)	5	0.015-0.07	
$C_3HF_2Cl_5$	(HCFC-222)	9	0.01-0.09	
$C_3HF_3Cl_4$	(HCFC-223)	12	0.01-0.08	
$C_3HF_4Cl_3$	(HCFC-224)	12	0.01-0.09	
$C_3HF_5Cl_2$	(HCFC-225)	9	0.02-0.07	
$CF_3CF_2CHCl_2$	(HCFC-225ca)**	-	0.025	122
CF_2ClCF_2CHClF	(HCFC-225cb)**	-	0.033	595
C_3HF_6Cl	(HCFC-226)	5	0.02-0.10	
$C_3H_2FCl_5$	(HCFC-231)	9	0.05-0.09	
$C_3H_2F_2Cl_4$	(HCFC-232)	16	0.008-0.10	
$C_3H_2F_3Cl_3$	(HCFC-233)	18	0.007-0.23	
$C_3H_2F_4Cl_2$	(HCFC-234)	16	0.01-0.28	
$C_3H_2F_5Cl$	(HCFC-235)	9	0.03-0.52	
$C_3H_3FCl_4$	(HCFC-241)	12	0.004-0.09	
$C_3H_3F_2Cl_3$	(HCFC-242)	18	0.005-0.13	
$C_3H_3F_3Cl_2$	(HCFC-243)	18	0.007-0.12	
$C_3H_3F_4Cl$	(HCFC-244)	12	0.009-0.14	
$C_3H_4FCl_3$	(HCFC-251)	12	0.001-0.01	
$C_3H_4F_2Cl_2$	(HCFC-252)	16	0.005-0.04	
$C_3H_4F_3Cl$	(HCFC-253)	12	0.003-0.03	
$C_3H_5FCl_2$	(HCFC-261)	9	0.002-0.02	
$C_3H_5F_2Cl$	(HCFC-262)	9	0.002-0.02	
C_3H_6FCl	(HCFC-271)	5	0.001-0.03	

* Where a range of ODPs is indicated, the highest value in that range shall be used for the purposes of the Protocol. The ODPs listed as a single value have been determined from calculations based on laboratory measurements. Those listed as a range are based on estimates and are less certain. The range pertains to an isomeric group. The upper value is the estimate of the ODP of the isomer with the highest ODP, and the lower value is the estimate of the ODP of the isomer with the lowest ODP.

** Identifies the most commercially viable substances with ODP values listed against them to be used for the purposes of the Protocol.

*** For substances for which no GWP is indicated, the default value 0 applies.

2. Annex F

The following annex shall be added to the Protocol after Annex E:

Annex F: Other Substances

Group	Substance	Global Warming Potential (100 year)
Group I		
CH_2F_2	HFC-32	675
CH_3F	HFC-41	92
CHF_2CF_3	HFC-125	3 500
CHF_2CHF_2	HFC-134	1 100
CH_2FCF_3	HFC-134a	1 430
CH_2FCHF_2	HFC-143	353
CH_3CF_3	HFC-143a	4 470
CH_2FCH_2F	HFC-152	53
CH_3CHF_2	HFC-152a	124
CH_3CH_2F	HFC-161	12
CF_3CHFCF_3	HFC-227ea	3 220
$CH_2FCF_2CF_3$	HFC-236cb	1 340
CHF_2CHFCF_3	HFC-236ea	1 370
$CF_3CH_2CF_3$	HFC-236fa	9 810
$CH_2FCF_2CHF_2$	HFC-245ca	693
$CHF_2CH_2CF_3$	HFC-245fa	1030
$CF_3CH_2CF_2CH_3$	HFC-365 mfc	794
$CF_3CHFCHFCF_2CF_3$	HFC-43-10 mee	1 640
Group II		
CHF_3	HFC-23	14800

Article II: Relationship to the 1999 Amendment

No State or regional economic integration organization may deposit an instrument of ratification, acceptance or approval of or accession to this Amendment unless it has previously, or simultaneously, deposited such an instrument to the Amendment adopted at the Eleventh Meeting of the Parties in Beijing, 3 December 1999.

Article III: Relationship to the United Nations Framework Convention on Climate Change and Its Kyoto Protocol

This Amendment is not intended to have the effect of excepting hydrofluorocarbons from the scope of the commitments contained in Articles 4 and 12 of the United Nations Framework Convention on Climate Change and in Articles 2, 5, 7 and 10 of its Kyoto Protocol that apply to "greenhouse gases not controlled by the Montreal Protocol." Since this amendment does not foresee a complete phase-out of emissive uses of hydrofluorocarbons, as the Montreal Protocol does for controlled substances, each party to this Amendment shall continue to apply the provisions of the United Nations Framework Convention on Climate Change and its Kyoto Protocol identified above to HFCs as long as those provisions, respectively, remain in force with respect to such party.

Article IV: Entry into force

1. Except as noted in paragraph 2, this Amendment shall enter into force on 1 January 2017, provided that at least twenty instruments of ratification, acceptance or approval of the Amendment have been deposited by States or regional economic integration organizations that are Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer. In the event that this condition has not been fulfilled by that date, the Amendment shall enter into force on the ninetieth day following the date on which it has been fulfilled.

2. The changes to Article 4 set out in Article I of this Amendment shall enter into force on 1 January 2019, provided that at least seventy instruments of ratification, acceptance or approval of the Amendment have been deposited by States or regional economic integration organizations that are Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer. In the event that this condition has not been fulfilled by that date, the Amendment shall enter into force on the ninetieth day following the date on which it has been fulfilled.

3. For purposes of paragraphs 1 and 2, any such instrument deposited by a regional economic integration organization shall not be counted as additional to those deposited by member States of such organization.

4. After the entry into force of this Amendment, as provided under paragraphs 1 and 2, it shall enter into force for any other Party to the Protocol on the ninetieth day following the date of deposit of its instrument of ratification, acceptance or approval.